

metals, still 7 cms. apart. We then found the difference of zeros to be -89 sc. divs., or -0.64 of a volt; but instead of seven minutes, scarcely a quarter of a minute was taken to reach the rays-zero after the metallic connection was broken. These results are substantially in accordance with Erskine Murray's §§ 9 of his paper already referred to.

KELVIN.
J. C. BEATTIE.
SMOLUCHOWSKI DE SMOLAN.

THE EFFECT OF MAGNETISATION ON THE NATURE OF LIGHT EMITTED BY A SUBSTANCE.¹

IN consequence of my measurements of Kerr's magneto-optical phenomena, the thought occurred to me whether the period of the light emitted by a flame might be altered when the flame was acted upon by magnetic force. It has turned out that such an action really occurs. I introduced into an oxyhydrogen flame, placed between the poles of a Ruhmkorff's electromagnet, a filament of asbestos soaked in common salt. The light of the flame was examined with a Rowland's grating. Whenever the circuit was closed both D lines were seen to widen.

Since one might attribute the widening to the known effects of the magnetic field upon the flame, which would cause an alteration in the density and temperature of the sodium vapour, I had resort to a method of experimentation which is much more free from objection.

Sodium was strongly heated in a tube of biscuit porcelain, such as Pringsheim used in his interesting investigations upon the radiations of gases. The tube was closed at both ends by plane parallel glass plates, whose effective area was 1 cm. The tube was placed horizontally between the poles, at right angles to the lines of force. The light of an arc lamp was sent through. The absorption spectrum showed both D lines. The tube was continuously rotated round its axis to avoid temperature variations. Excitation of the magnet caused immediate widening of the lines. It thus appears very probable that the period of sodium light is altered in the magnetic field. It is remarkable that Faraday, as early as 1862, had made the first recorded experiment in this direction, with the incomplete resources of that period, but with a negative result (Maxwell, "Collected Works," vol. ii. p. 790).

It has been already stated what, in general, was the origin of my own research on the magnetisation of the lines in the spectrum. The possibility of an alteration of period was first suggested to me by the consideration of the accelerating and retarding forces between the atoms and Maxwell's molecular vortices; later came an example suggested by Lord Kelvin, of the combination of a quickly rotating system and a double pendulum. However, a true explanation appears to me to be afforded by the theory of electric phenomena propounded by Prof. Lorentz.

In this theory, it is considered that, in all bodies, there occur small molecular elements charged with electricity, and that all electrical processes are to be referred to the equilibrium or motion of these "ions." It seems to me that in the magnetic field the forces directly acting on the ions suffice for the explanation of the phenomena.

Prof. Lorentz, to whom I communicated my idea, was good enough to show me how the motion of the ions might be calculated, and further suggested that if my application of the theory be correct there would follow these further consequences: that the light from the edges of the widened lines should be circularly polarised when the direction of vision lay along the lines of force; further, that the magnitude of the effect would lead to the deter-

mination of the ratio of the electric charge the ion bears to its mass. We may designate the ratio e/m . I have since found by means of a quarter-wave length plate and an analyser, that the edges of the magnetically-widened lines are really circularly polarised when the line of sight coincides in direction with the lines of force. An altogether rough measurement gives 10^7 as the order of magnitude of the ratio e/m when e is expressed in electromagnetic units.

On the contrary, if one looks at the flame in a direction at right angles to the lines of force, then the edges of the broadened sodium lines appear plane polarised, in accordance with theory. Thus there is here direct evidence of the existence of ions.

This investigation was conducted in the Physical Institute of Leyden University, and will shortly appear in the "Communications of the Leyden University."

I return my best thanks to Prof. K. Onnes for the interest he has shown in my work.

P. ZEEMAN.

Amsterdam.

NOTES.

THE Council of the Royal Society have invited Prof. C. S. Sherrington, F.R.S., Professor of Physiology in University College, Liverpool, to deliver the Croonian Lecture on April 1, the subject being "The Spinal Cord and Reflex Actions."

TUESDAY'S *Gazette* contains the formal intimation that the dignity of a Baron of the United Kingdom has been granted to Sir Joseph Lister, Baronet, President of the Royal Society, by the title of Baron Lister, of Lyme Regis, in the county of Dorset.

PROF. DR. RUDOLF VIRCHOW has been elected president of the German Anthropological Society for the year 1897.

It is expected that Prof. Barnard will attend the meeting of the Royal Astronomical Society to-morrow, February 12, to receive the gold medal which has been awarded him for his numerous contributions to astronomy. Sir Robert Ball has been nominated as the new president of the Society.

THE Council of the Royal Meteorological Society have arranged to hold, from March 16 to 19, in commemoration of the diamond jubilee of H.M. the Queen, an exhibition of meteorological instruments in use in 1837 and in 1897, and of diagrams, drawings, and photographs illustrative of the advances which have been made.

THE Government of the Colony of the Cape of Good Hope has undertaken an investigation of the marine fauna of the South African coast, with reference both to economic value and scientific interest. A small marine station will probably be erected on False Bay, and a suitable steam vessel of about 150 tons is now being built for this purpose. It is confidently hoped that results of some scientific value may be obtained from the exploration of this little-known coast, and more especially of the Agulhas Bank. We are requested to state that the services of specialists are invited to work up the material that may be procured, under the following arrangements. Specimens will be forwarded as procured, and, on receipt of manuscript and drawings, each piece of work will be published without delay in a uniform style, so as to form ultimately a complete record of the Cape marine fauna. Authors' copies will be forwarded as soon as published, and a certain circulation will be guaranteed. No money remuneration is offered, but duplicate specimens may be retained by the authors. Unique specimens it is intended to be handed over to the South African Museum in Cape Town. Further information will be supplied to those interested in the work, on application to J. D. F. Gilchrist, Marine Biologist to Cape Government Agricultural Department, Cape Town.

¹ Translated by Arthur Stanton from the *Proceedings* of the Physical Society of Berlin.

ON Wednesday evening, February 3, the Leathersellers' Company entertained at a Court dinner a considerable number of representatives of the colonies and dependencies of the empire, including Sir Donald Smith (High Commissioner for Canada), Sir Saul Samuel (Agent-General for New South Wales), and many others. The company also included many of the scientific friends of the Master, Dr. W. H. Perkin, F.R.S., himself one of the foremost of British chemists, and popularly known as the discoverer of "mauve," the first of the colours derived from coal-tar. The Leathersellers' Company, like others of the great guilds of London, are now devoting part of their revenues to promoting scientific education with a view especially to its application to industrial pursuits; and, recognising the importance not only of elementary instruction, but the cultivation of the highest branches of scientific work, they have recently established a research scholarship, of the value of £150 a year, in connection with the Central Technical College of the City and Guilds of London Institute (see p. 332).

THE late M. James Lloyd, of Nantes, author of the "Flore de l'Ouest de la France," who died in May last, has bequeathed his fortune and his collections to the town of Angers. The latter consist chiefly of a herbarium and a botanical library, which are to be housed in a special building, and funds are left for their maintenance, and for the payment of a curator, who is to be selected by the Mayor of Angers from a list of three candidates to be nominated by the President of the Botanical Society of France. The names of candidates are to be sent to the President of the Society, 84 Rue de Grenelle, Paris, by March 15, and the post is to be conferred "en dehors de toute considération de grades universitaires," on "un botaniste humble, ami de la nature, voué au progrès de la science que j'ai aimée et cultivée."

THE Vienna Academy of Sciences has (says the *Lancet*) employed a portion of the Treilt Fund in sending a commission, composed of Dr. Hermann Müller, Dr. Ghon, Dr. Albrecht, and Dr. Pösch, to investigate the nature of the bubonic disease now prevailing in India. The members of the expedition have just left Trieste, and will remain at Bombay for three or four months. The Treilt Fund is so called after the late Herr Treilt, a Vienna citizen, who bequeathed to the Academy all his fortune, amounting to about £100,000.

IN view of the increasing interest now being taken in the subject of aerial navigation, it has been decided to endeavour to place the Aeronautical Society on a more useful footing. The Council propose, should sufficient support be given, to greatly increase the scope of the Society; to issue a journal at least quarterly, containing not only reports of meetings of the Society, but original articles, reprints, and records of all that is going on at home and abroad in the subject of aeronautics, and all news likely to be of interest to members; to hold frequent meetings for the reading and discussion of papers and exhibition of models; to collect a library of books and periodicals for reference of members; and, if possible, to procure the use of a room as library and museum. The Hon. Secretary of the Society is Captain B. Baden-Powell.

WE regret to announce the deaths of the following men of science:—Heinrich Gätke, the ornithologist, whose observations on bird-migration for fifty years are published in his "Heligoland as an Ornithological Observatory"; Prof. Franz Baur, professor of forestry in Munich University; Dr. August Streng, professor of mineralogy in the University of Giessen; Dr. E. A. B. Lundgren, professor of geology in the University of Lund; A. A. van Bemmelen, director of the Zoological Gardens at Rotterdam, and for many years president of the Netherlands Zoological Society; Dr. Hermann v. Nördlinger, formerly professor of forestry in the University of Tübingen;

Dr. Salvatore Trinchese, professor of comparative anatomy and comparative embryology in the University of Naples, and the author of many valuable works in general biology; and Galileo Ferraris, the well-known electrician, of Turin.

FIFTY years spent in scientific investigation is a period worth commemorating. We therefore offer our congratulations to Dr. H. C. Sorby, F.R.S., upon the attainment of his jubilee as contributor to the advancement of natural knowledge. From the *Sheffield Daily Telegraph* we learn that a few evenings ago Dr. Sorby inaugurated his year of office, as President of the Sheffield Literary and Philosophical Society, by giving an address upon a half-a-century spent in scientific work. In this interval he has published more than one hundred papers, which have made for the progress of science. His first papers were on animal and vegetable chemistry; the earliest being published in 1847. Very soon afterwards his attention was specially directed to the structures produced by currents during the deposition of stratified rocks, and to the conclusions to be derived from them. In 1849 he prepared what were the first transparent microscopical sections of rocks, and his first paper on thin microscopical structures was published in 1850, in which most of the modern methods were first adopted. That was followed by numerous papers on the structure of rocks and minerals, or on chemical or physical questions connected with them. From the study of the microscopical structure of rocks, he was led to that of meteorites and meteoric iron. In order to throw light on that subject he commenced, in 1842, the microscopical study of iron and steel by new methods and new illuminators. In order to assist in the study of meteorites, Dr. Sorby invented, in 1865, the direct-vision spectrum microscope, and various accessory apparatus. The application of those instruments led to the study of the colouring matters of animals, plants and minerals, and to the publication of about forty papers connected with almost every department of science. Dr. Sorby has also advanced many other branches of knowledge, his researches on marine organisms, and in connection with the archaeology of natural history, being especially noteworthy. Nearly thirty years back the value of his work was recognised by the presentation of the Wollaston gold medal from the Geological Society. A quarter of a century ago the Dutch Academy of Sciences made him the first recipient of the Boerhaave gold medal, which is only awarded once in twenty years. Two years afterwards—in 1874—the Royal Society awarded him a Royal medal. Then followed the honorary degree of LL.D., conferred upon him by Oxford University. Dr. Sorby's services to science have thus been recognised by various authorities, and we trust he may still live long to add to the researches which have enriched the storehouse of knowledge.

THE annual general meeting of the Society for the Protection of Birds will be held on Tuesday, February 23, at the Westminster Palace Hotel. The Earl of Stamford will occupy the chair.

THE *Weekly Weather Report*, issued by the Meteorological Office, states that for the week ending the 6th inst. the rainfall was much in excess of the mean over England and the south of Ireland, the fall being in most cases three and four times as great as the average value. Over Scotland and the north of Ireland the amount was less than normal. In most parts of England the rainfall since the beginning of the year is about an inch above the average, while in the north and west of Scotland the deficiency is about four inches.

THE *Rendiconti del Reale Istituto Lombardo* announces the award of the following prizes:—One of the five Cagnola prizes of 2500 lire, and a gold medal, of value 500 lire, to Dr. Andrea

Giulio Rossi, of Padua, for his essay on methods of registering the phases of two alternating currents. The Brambilla prize of 1500 lire and a gold medal are awarded to Prof. Carlo Figini, for his improvements in the weaving industry; and rewards, of 500 lire each, to Signor Sala Salvatore and Signor Scartazzi Antonio. The Fossati prize of 2000 lire is awarded to Prof. Angelo Mosso, of Turin, for his essay on the temperature of the brain. For the Tommasoni prize for an account of the life of Leonardo da Vinci, rewards of 1000 lire each have been awarded to Signor Nino Smiraglia Scognamiglio and Prof. G. B. De Toni. A number of other prizes have been unawarded.

FOR the coming year, the Reale Istituto Lombardo offers the following prizes, which are open to competitors of all nationalities, on condition that the essays are written in Italian, French, or Latin. The prize of the Institution of 1200 lire, for experiments confirming Maxwell's theory of dielectric stresses; six Cagnola prizes of 2500 lire, each accompanied by a gold medal of 500 lire, for essays on various selected subjects, mostly medical; one Brambilla prize, for improvements in some industry in Lombardy; one Secco-Comneno prize of 864 lire, for an essay on uræmia; and prizes founded by the brothers Giacomo and Filippo Ciani, for popular Italian literary works. A number of other prizes are also announced in the *Rendiconti* of the Institution, both for competition in 1897 and later years; but many of these are exclusively open to Italians. A full account of the conditions attaching to the various competitions is given in the journal in question.

AT the ninth annual meeting of the American Physiological Society, held in Boston and Cambridge, December 29 and 30, 1896, Prof. W. H. Howell proposed the following resolution regarding the work of the late Prof. H. Newell Martin:—"The members of the American Physiological Society have heard with profound regret of the death of Prof. H. Newell Martin. In commemoration of his distinguished services, the Society adopts and places upon its official record the following expression of its appreciation and esteem. In the death of Prof. Martin, the Society has lost a member to whom it owes an especial debt of gratitude. He was actively concerned in its foundation and organisation, and during the critical period of its early history he gave much time and thought to its interests. He served for six years as its secretary and treasurer, and strove always with enthusiasm to make a successful beginning of an enterprise which he believed would foster the spirit of scientific research in physiology, and bring its active workers into stimulating fellowship. For its present prosperous condition, and its prospects of future usefulness, the Society feels that it is largely indebted to his wisdom and energy. In a broader field his influence upon the science of physiology has been deeply felt. His own splendid contributions to experimental physiology will have an enduring value, while the stimulus given by him to others has been, and will continue to be, an influential factor in the development of physiological instruction and research in this country. As an investigator and teacher he was distinguished, not only by his originality and ability, but by many noble traits of character. His modesty, his genuine interest in all kinds of biological work, his steady insistence upon the highest ideals of scientific inquiry, his chivalrous conception of the credit due to his fellow-workers, and the generous sympathy and affection always felt and shown by him for the work of younger investigators, are some of the qualities which will endear his memory to those who were so fortunate as to be brought into intimate association with him as teacher or as friend." Prof. H. P. Bowditch, in seconding the resolution, said:—"Probably few of the younger members of the Society are aware of the great debt which we owe to Dr. Martin for establishing the high standard which the Society has always

maintained with regard to the qualifications of the members. It was always Dr. Martin's contention that a candidate for admission to our ranks should be required to demonstrate his power to enlarge the bounds of our chosen science, and not merely to display an interest in the subject and an ability to teach textbook physiology to medical students. To his wise counsel in this matter the present prosperity of the Society is, I think, largely to be attributed. I trust that the resolution will be adopted, and placed upon the records of the Society." The resolution was unanimously adopted.

THE manna sent to the Israelites on their journey out of Egypt to the Holy Land is regarded as identical with an edible lichen in Kerner and Oliver's "Natural History of Plants"; and the older view that it was the sap of a tamarisk, exuded under the influence of a parasite, is held to be without foundation. Mr. M. J. Teesdale reviews the subject in the February number of *Science Gossip*, and the evidence he brings forward is opposed to the conclusion to which reference has been made. He shows that an exudation from the twigs of the tamarisk (*Tamarix gallica*) has more points of resemblance with the manna of the Israelites than either the edible lichen or the sweet gums exuded by leguminous shrubs, such as *Alhagi maurorum* or *A. desertorum*—both known to the Arabs as camel's-thorn.

HERR K. RÖDER gives, in a dissertation presented for a Leipzig degree, the results of an investigation as to the polar limit of true forest-land, as distinguished from tundra. The boundary line reaches its highest latitude in the old world in the Taimyr peninsula ($72\frac{1}{2}^{\circ}$ N.), runs eastward to the Tschuktschee peninsula, and there bends rapidly to the southward. On the west coast of America it begins near the Arctic circle, and goes gradually northwards to the Mackenzie delta, where it attains its highest latitude in about 69° N. The most southerly point is in 57° N. lat., on the East Main River, and from thence the limit crosses Labrador, Greenland and Iceland, in a direction trending towards the North Cape.

WE have received the third of the *Arbeiten aus dem Geographischen Institut der Universität Bern*, edited by Prof. Brückner, consisting of an exhaustive discussion, by Dr. Hermann Walser, of the surface changes which have taken place in the canton of Zürich since the middle of the seventeenth century. Dr. Walser takes, as his starting point, the topographical map of J. C. Gyger, published in 1667, and traces the subsequent topographical history of the district by reference to an immense number of papers and maps to the present time. He finds that geological and human agencies have combined during the last 240 years to greatly diminish the number and size of lakes in the canton, that the amount of deforestation has been trifling, and that the area occupied by vineyards has steadily increased.

THE spell of warm weather in the United States, from July 28 to August last, is stated by Prof. H. A. Hazen, in the *Monthly Weather Review*, to have covered a larger area, and given abnormally high temperatures for a greater number of consecutive days than ever before recorded.

A SOLAR halo, with two mock-suns, and a rainbow overhead, was seen by Mr. J. W. Scholes, Huddersfield, at about 12.30 p.m. on January 29. The mock-suns and the rainbow only lasted a few minutes, but the white solar halo remained visible for nearly half an hour.

IT will be remembered that, some years ago, experiments on rain-making were carried on in Texas. In a short brochure, Dr. W. Hentschel suggests a plan of artificially producing rain, based on the well-known effects of statical electricity in promoting the formation of drops. The suggestion is to

reverse Franklin's historic kite experiment, and instead of drawing electricity from the clouds, to electrify a balloon by means of a conducting cable connected with a dynamo. In this way, the writer maintains, the rainfall can be increased, or, possibly, even decreased, at pleasure.

In an article entitled "Fog Possibilities," Mr. A. McAdie, in *Harper's Monthly Magazine* for January, refers to the possibility of dispelling fog from crowded thoroughfares. The experiments of Aitken and others have shown the close relationship between fog, cloud, or haze, and the number of dust particles in the air. If we can remove the dust from the air, we remove the nuclei of condensation. Dr. Lodge has pointed out various methods by which this can be effected in laboratory experiments, the most successful of which is electrification. The author considers that by this means the fog can probably be dissipated and the air clarified. The supply of fog may be such that there would be little appreciable diminution, but as a rule the fog is localised and has well-marked limits.

AN important series of experiments on the absorption of ultra-violet light by crystals, has been conducted at Geneva by M. V. Agafonoff, of St. Petersburg (*Archives des Sciences physiques et naturelles*, iv. 2). Among the 100 different crystalline substances observed, only two were found to exhibit differences of absorption according to the direction of polarisation of the light; these were tourmaline and hemimellitic acid, which gave different absorption spectra for the ordinary and extraordinary rays of a doubly-refracting prism. Isolated absorption bands are rare, and were only found in the seven following substances: sulphate of magnesium, sulphate of ammonium and nickel, ammoniacal alum, nitrate of nickel, nitrate of potassium, dithionate of barium, and anthraquinone. The thickness of the section seems to have very little influence on the limit of wave-length at which absorption commences. The powerful absorption of organic, as compared with inorganic compounds, suggests that highly complex molecules are more absorbent of ultra-violet light than simple molecules; and, if this be the case, the property may afford a test of the relative complexity of different compounds.

FROM Mr. William Barlow we have received a reprint of his important communication to the *Mineralogical Magazine*, entitled "On Homogeneous Structures and the Symmetrical Partitioning of them, with Application to Crystals." The author gives a new definition of homogeneous structure, and describes a method of realising, in a concrete form, the kind of repetition in space which constitutes homogeneity of structure. The total number of types, all of which can be represented in this way, is 230, this being the number of typical point systems described by Federow and Schönflies, derived by their extension of Sohncke's methods. These all fall into the thirty-two classes of crystalline symmetry. The author gives reasons for rejecting Federow's arguments in support of his recent attempt to select from among the types of homogeneous structure those which are possible for crystals, and he shows the possibility of so classifying all the conceivable ways of symmetrically partitioning all the types of homogeneous structure as to avoid all reference to the nature of the cell faces. Among the reasons for undertaking this classification, the chief one is the relation of symmetrical partitioning to certain stereo-chemical and other facts.

THE latest evidence as to the occurrence of Man in the Glacial Period has just appeared in the *American Geologist* (vol. xviii. p. 302), where Dr. E. W. Claypole records the finding of a grooved stone axe at a depth of 22 feet in the drift of North-central Ohio. The axe, which was partially imbedded in boulder clay, lay in a bed of coarse gravel 1 foot in thickness; above this was a bed of silt, 13 feet in thickness,

and very tough below; interbedded in this were streaks of sand; finally, there were superimposed 8 feet of clay. Dr. Claypole regards these beds as having been "the deposits of the torrents of water and the still pools which characterise the flow from the front of a glacier in a flat country"; he supports his statement by a description of the district, and he also enters into the *bonâ fides* of the discoverer of the implement. The axe was made of a hard, banded green slate, but it was oxidised throughout, owing to the sulphureous character of the water in the gravel; the concentric lines of colour (limonite stains), parallel to the contour of the implement, prove that the change has taken place since it was fashioned by its Neolithic maker, and the rotten state of the stone shows that it must have been imbedded in the gravel for a very long time. It is always a difficult matter to sift the evidence of such finds, but this one appears to be worthy of the critical examination of American geologists and archaeologists.

FOSSIL bones of the Pleistocene age have been brought to the Academy of Sciences of Philadelphia from Port Kennedy, Montgomery County, Pa. The fossil deposit seems almost unlimited; and while it contains no complete skeletons, it is, in many respects, the richest ever discovered. Bones form fully one-third of the material in the giant fissure, but most of them are so crushed and distorted as to be of no value. About forty distinct varieties of animals have been found in the mass.

PRESIDENT DAVID S. JORDAN, of Leland Stanford Junior University, Commissioner to investigate the condition of the fur seal, recommends, in his report to the Secretary of the Treasury, that the open season for the killing of females be abolished, to keep the Pribilof herd intact. He estimates the number of seals killed last summer as 440,000. About 27,000 pups died of starvation, and pelagic sealing caused the death of about 30,000. Since pelagic sealing began, more than 600,000 fur seals have been taken in the North Pacific and in Bering Sea, taking into account only those whose skins were brought to market. Many more were shot or speared, and lost. The number reported means the death of 400,000 females, the starving of 300,000 pups, and the destruction of 400,000 pups unborn.

THE January number of the *Quarterly Journal of Microscopical Science* contains only two memoirs, both of which are more than usually suggestive and interesting. Miss Lily Huie describes the results of a very precise and systematic investigation of the changes which take place in the protoplasm and nucleus of the gland-cells in the tentacles of the sun-dew *Drosera rotundifolia*, after the feeding of the leaf with pieces of white of egg. The first effect of the contact of the food appears to be the discharge of secretion from the gland cells. The secretion is formed at the expense of the basophile cytoplasm, which is stained by alkaline stains. The nucleus produces new cytoplasm of the same kind, by absorbing nutriment, converting it, and then "excreting" it. In this process the nuclear chromatin takes the form of V-shaped chromosomes, and the nucleolus grows smaller and almost disappears. The nuclear chromatin increases in bulk. Thus the changes which occur resemble those to which so much attention has been directed in mitosis or the division of the cell, and the conclusion is drawn that these changes indicate great activity in the nuclear organs, and are not exclusively characteristic of cell-division.

THE second paper in the January *Q. J. M. S.* is by Messrs. J. T. Wilson and J. P. Hill, of the University of Sydney, New South Wales, on the development and succession of the teeth in the marsupial *Perameles*, and in other marsupials. It is well known that only one tooth, the last of the premolars, is observed to be shed and replaced by a successor in

these mammals; and the view once generally accepted was that the other teeth corresponded not to the milk-teeth, but to the permanent teeth of higher mammals. The absence of milk-teeth, with the one exception, in marsupials has been regarded as indicating, not that they have disappeared in the evolution of these animals, but that they first arose in the later evolution of the higher mammals. Other views, however, have been maintained, namely, on the one hand, that the temporary dentition has been lost by the marsupials; and, on the other hand, that the existing anterior teeth are in reality milk-teeth whose successors have ceased to appear. Certain traces of teeth in the jaws of the embryo, precursors of the permanent teeth, have been explained as "prelacteal teeth" by those who advocate the latter view. In this memoir the authors claim to have proved that there is a complete series of these prelacteal teeth or their papillæ, and that they in reality represent the series of milk-teeth in the higher mammals. Thus the peculiarity of the marsupial dentition is that the temporary or milk teeth have become, with the exception of the last premolar, rudimentary, and the permanent teeth are completely developed before the young animal is weaned.

THE Johns Hopkins University Press, Baltimore, publishes a somewhat bulky "History of the Tobacco Industry in Virginia from 1860-1894," by Dr. B. W. Arnold.

DR. V. FATIO has sent us a copy of his guide to the hunting and fishing collection in the Swiss National Exposition of 1896. The volume contains some interesting information on the fishes of Switzerland.

BY the not very happy term "phenological," recent botanical writers speak of phenomena connected with the flowering of plants and other seasonal characters. The American botanist, Prof. L. H. Bailey, sends us a useful paper of "Instructions for taking Phenological Observations."

IN the concluding part of Dr. Bokorny's paper in the *Biologisches Centralblatt*, on the nutrition of green plants, he sums up in favour of the view that the first product of assimilation in green plants is formic aldehyde, from which are afterwards formed either albuminoids by the action of ammonia, or carbohydrates by condensation. Green fresh-water organisms play a very important part in the purification of running water by the oxidation of organic substances in suspension.

THE first number of vol. iv. of the *Bulletin* of the Laboratories of Natural History of the State University of Iowa contains papers about equally distributed between zoology and phytology:—On Plymouth hydroids, by C. C. Nutting; on the mollusks and brachiopods of the Bahama Expedition, by W. H. Dall; on the hymenoptera of the Bahama Expedition, by W. H. Ashmead; on the puff-balls of Eastern Iowa, by T. H. Macbride and Norra Allen; on new species of tropical fungi, by J. B. Ellis and P. M. Everhart; and others.

PROVINCIAL museums are following the lead of the National History Museum in issuing interesting and instructive handbooks on their collections, instead of mere catalogues of specimens. An admirable handbook of this character, referring to the mineralogical and geological sections of the Royal Museum of the County Borough of Salford, has been prepared by Mr. Herbert Bolton, who also re-arranged and named the collections. His little guide will arouse the interest of casual visitors, and will also greatly aid and encourage the study of geology.

A GENERAL meeting of the members of the Federated Institution of Mining Engineers will be held on Wednesday, February 17, at Manchester. The following papers will be read, or taken as read:—Railway nationalisation in relation to the coal trade, by Mr. A. Clement Edwards; the cost and

efficiency of safety explosives as compared with gunpowder, by Mr. Henry Hall; description of various types of ropeways, and remarks as to their proper selection, by Mr. W. Carrington; determination of fire-damp in French collieries, by Mr. J. Coquillion; appliances for winding water, by Mr. Wm. Galloway; the detection and estimation of carbon monoxide in air by the flame-cap test, by Prof. F. Clowes; the Lake Superior iron ore region, by Mr. Horace V. Winchell.

THE January number of *Himmel und Erde* is devoted to several articles of general interest. Dr. Hecker, of Potsdam, describes how the small movements of the earth's surface are detected and measured. Two diagrams show clearly the details and general construction of the horizontal-pendulum, the instrument invented by von Rebeur-Paschwitz; while the reproductions from the actual photographic records explain for themselves the continual state of vibrations that is always occurring, and the occasional disturbances of larger amount. Dr. Zenker describes the extraordinary cold climate of Werchojansk (Siberia). The temperatures for each month, as obtained from the mean values up to the present time, are in degrees Centigrade—

Jan.	Feb.	March.	April.	May.	June.
-51.1	-45.8	-33.3	-13.6	2.0	12.6
July.	Aug.	Sept.	Oct.	Nov.	Dec.
15.6	10.2	2.6	-14.8	-39.8	-48.0

Prof. Dr. Fritz Frech concludes his series of articles on "Coral-reefs, and their share in the structure of the Earth's Crust." This series, we may remark, has been illustrated very profusely. "Eine Kulturbewegung in der Naturwissenschaft" is the title of a more brief article by Dr. Hallervorden, in Königsberg. In his concluding sentences he asks, "Why has Kant been forgotten? Ihn, den Schöpfer sittlicher Persönlichkeit! Why has his house in Königsberg been long ago destroyed? Was it not like Goethe's, a relic of the nation—the nation?—of mankind, I ought to have said."

THE Zi-ka-wei Observatory, near Shanghai, has published a discussion of the disastrous typhoon which occurred in the Eastern Seas between July 22-25, 1896, in which the German gunboat *Illis* was lost in the neighbourhood of the south-east Shantung promontory. This storm had first passed in the immediate neighbourhood of Shanghai, and the Rev. L. Froc has been able to collate a large amount of observations, both from ships which rode through the typhoon, and from land stations, which plainly show the extent and behaviour of the disturbance; and he has accompanied these observations with remarks which will be of practical use for the guidance of navigators. The storm took an unusual track, but was otherwise of regular constitution; the wind attained hurricane force, which was continued at some places for at least twelve hours. It is satisfactory to note that warning of its approach was given both by the Manila and Hong Kong Observatories, and that consequently two vessels, the *Pekin* and the *Yarra*, remained in port at Shanghai, and thereby in all probability avoided serious damage. We may mention that Dr. Doberck has also published an independent account of this storm in the *Hong Kong Government Gazette*.

THE additions to the Zoological Society's Gardens during the past week include a Patas Monkey (*Cercopithecus patas*) from West Africa, presented by Mr. A. F. Breyzig; a Bonnet Monkey (*Macacus sinicus*, ♀) from India, presented by Mr. E. James; an Egyptian Monitor (*Varanus niloticus*) from the Transvaal, presented by Mr. D. E. Erasmus; a Red-eyed Ground Finch (*Pipilo erythrophthalmus*) from North America, deposited; a Tantalus Monkey (*Cercopithecus tantalus*, ♀?) from West Africa, a Black-headed Lemur (*Lemur brunneus*, ♂) from Madagascar, purchased.